

**Estimating the Number of Orphans in Rwanda:
A Methodology Assessment**

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I. Introduction

The unfolding of the AIDS epidemic has given rise to a rapid increase in the number of orphans in some of the world's least developed regions. The most recent joint orphan report "Children on the brink" published by UNICEF, UNAIDS and USAID estimates that a total of 43.4 million children under 18 years have lost at least one of their biological parents in sub-Saharan Africa. Among these children, 12.3 million (28%) are believed to have been orphaned by AIDS (UNICEF/UNAIDS/USAID 2004: 26).

Rwanda has been a challenging case for orphan estimates and projections. The total number of orphans increased several-fold with the 1994 genocide that resulted in the death of nearly one million Rwandans. Millions of people were also displaced and large numbers were arrested, resulting in numerous parent-child separations. The scale of death and disruption of society caused by the genocide can only be implied by the statistics. World Bank data, for example, record a decrease in total population from 7,608,000 in 1993 to 5,272,000 in 1994, a number that recovered slowly in subsequent years with returning refugees and general population growth (World Bank 2004). In 1997/98, a second wave of violence killed an estimated 50,000 people and displaced 100,000 (Vaele *et al.* 2001: 19).

In recent years, HIV/AIDS has affected a growing proportion of the Rwandan population. 220,000 adults, or 5.1% of Rwandans aged 15-49 years, were estimated to be living with HIV/AIDS at the end of 2003 (UNAIDS 2004: 191). The HIV prevalence among young women (15-24 years) in the capital, Kigali, is even higher, with an estimated 11.6% in 2002 (UNAIDS 2004: 1994).

The need to have relatively accurate estimates of the number of orphans in a country is self-evident. With changes in family structure resulting from the HIV/AIDS epidemic, conflict and complex emergencies in the region, it seems probable that numbers will increase. Rwanda is a good example of a country where the methods for measuring orphan characteristics can be compared because of its small size and national focus of the current government on resolving the orphan issue in the most positive way possible.

Using Rwanda as an example, we will compare the different methods used to measure the number of orphans and demonstrate their potential impact on policy. A combined method is suggested to improve the approach for measurement and therefore improve the management and welfare orphan populations.

II. Definitions

Orphan – An orphan is commonly defined as “a child under the age of 18 who has had at least one parent die. A child whose mother has died is known as a maternal orphan; a child whose father has died is a paternal orphan. A child who has lost both parents is a double orphan” (UNAIDS 2004).

AIDS orphan – AIDS orphans are a subgroup of the general orphan population. “A consensus was reached on the definition of an AIDS orphan as ‘a child who has at least one parent dead from AIDS’, and

a dual (or double) AIDS orphan as ‘a child whose mother and father have both died, at least one due to AIDS’ (UNAIDS Reference Group 2002).

Other vulnerable children – According to UNICEF, “‘other vulnerable children’ include those who are living with HIV/AIDS, those whose parents are sick with HIV/AIDS, and, more generally, children who are especially vulnerable because of poverty, discrimination or exclusion, whether as a consequence of HIV/AIDS or not” (UNICEF 2003).

III. Measuring the Number of Orphans

Measuring the number of orphans in Rwanda has been attempted in a number of ways. A complete population census is always the best method; however, census techniques are expensive, time-consuming and difficult to execute in harsh environments. A second method utilizes orphan estimates derived from large population-based surveys based on stratified, probability-based samples as for example the UNICEF Multiple Indicators Cluster Surveys (MICS) and the Demographic and Health Surveys (DHS). More recently, a third method has been proposed by the UNAIDS Reference Group on Estimates, Modelling, and Projections that attempts to calculate orphan estimates using models based on adult mortality, fertility and child survival statistics. In addition, small but vulnerable sub-groups of the orphan population – in particular non-household based orphans such as street children and children in orphanages – often receive little attention from the established methods and may be more effectively covered by separate, in-depth studies. These studies may include sample surveys as well as key informant interviews, focus group discussions and related methods. Each of these methods has been used to some extent to estimate the number, percentage, and other characteristics of Rwanda’s orphan population.

A. Orphan Estimates Based on Census Data

Data derived from a well-executed population census, designed to include all individuals in a population, will present the most accurate picture of the total number of orphans and their population characteristics. A complete census is the preferred method in particular for generating an estimate of the total number of orphans in the population. However, a population census comes with high costs, is logistically challenging, and usually conducted infrequently. Furthermore, census data tends to undercount some population sub-groups, often most vulnerable groups like the homeless, migrants, and other mobile or minority populations. For example, while household-based orphans are likely to be covered by a population census, children in orphanages and in particular orphans living on the streets tend to be undercounted. Adjustments for this undercounting can be made but may be statistically challenging and are often controversial (Rossi *et al.* 1999: 127-128). In Rwanda, just three population enumerations have been implemented to date. The first census was conducted in 1978, the second in 1991, and the third and most recent one in 2002. The 2002 national census covered a total of 8,128,553 people (SNR 2002c: 3). At this time, the entire population was estimated to be 8,163,000 in 2002 (World Bank 2004).

The 2002 population census addresses orphaned children as part of several groups of “children in a difficult situation” (SNR 2002b). According to the census, there are 1,151,878 orphans under the age of 18 in Rwanda. That includes 352,417 maternal orphans (single and double orphans), 982,086 paternal orphans (single and double orphans) and 182,625 double orphans. There is an additional 112,185

children for whom the status of their parents is unknown due to family separation and other reasons (SNR 2002b: 92). Overall, 27.2% of all children below 18 years were identified as orphans, including 8.3% children who had lost their mother, 23.2% children who had lost their father and 4.3% who had lost both parents (SNR 2002b: 93). Clearly the number of paternal orphans is extremely high (23.2%), as is the total number of orphans (27.2%).

The 2002 Rwandan census does not examine the development of orphan numbers over time, nor does it attempt to explain the causes and contributing factors to children becoming orphans. We know the genocide played a major role as well as the AIDS epidemic; however, to quantify its impact would be challenging in a population census even if it were attempted. In addition, special population like street children and children in orphanages are not covered as a distinct group and likely to be covered only partly at most. Although the census has been described as an “attempt to identify all orphans by inquiring a household member if any resident has lost a mother and/or father, enumerating children in UAC centers [orphanages], and, by working through local authorities, ... to count children living on the street” (Greenwell 2002: 35), none of this information is found in the data analysis. The analysis, however, provides some data about the distribution of the orphan population by region, sex, age and level of education (SNR 2002b).

B. Orphan Estimates Derived from Population-Based Surveys

Sample surveys are another important method for generating estimates of orphan numbers. Household surveys are frequently used to generate estimates of the percentage of orphans in a population. Like a population census, a household survey requires a considerable amount of skills and resources. While the sample size is much smaller than a complete population enumeration, thousands of subjects still need to be interviewed if valid estimates of sub-groups are to be collected. In addition, sampling on a national level is complex and susceptible to the introduction of a wide range of potential bias.

There are currently two large scale household survey programs that have been implemented in a wide range of countries in sub-Saharan Africa, the USAID Demographic and Health Surveys (DHS) and the UNICEF Multiple Indicators Cluster Surveys (MICS). The DHS and the MICS collect data from stratified and nationally representative population samples on a variety of demographic and health indicators and they include some orphan characteristics. The DHS and MICS both select their samples using a two-stage cluster sampling design. In the first step, neighborhood clusters are selected with probability proportional to size. In the second step, a complete household listing is assembled for the selected clusters. Individuals in the selected households are interviewed. The household questionnaire collects information about all household members including the survival status of the biological parents of all children and the residence status of surviving parents. Information regarding schooling and child labor sometimes is also included. Like most national-level studies, DHS and MICS data does not inquire about causes of parental mortality. Both the DHS and the MICS define an orphan as a child under 15 years of age that has lost one or both of his or her parents while older children are not considered. In addition, household-based surveys like the MICS and the DHS generally exclude children not living in households, such as children in orphanages and other institutions and children living on the streets. Other children that may not be included in the survey may be “those in residential transition and those employed as live-in domestic servants” as well as children that are “misclassified as a non-orphan, having been claimed by adults in the household as their own (the adoption effect)” (Bicego *et al.* 2003: 1236-1237).

Rwanda has been covered by both MICS and DHS. MICS data are available for 2000 (UNICEF 2001, UNICEF 2004). DHS data are available from 1992, 2000 and 2006 (Measure DHS 2004, ONAPO/ORC

Macro 2001a, INSR/ORC Macro 2006). The MICS 2000 and the DHS 2000 allow comparing data collected by different surveys in the same year. The DHS 1992, 2000 and 2006 provide the opportunity to analyze orphan data over time. Table 1 shows the DHS and MICS orphan estimates compared with the national census from 2002.

Table 1: Comparison of orphan estimates based on population-based surveys versus census data in Rwanda

| | DHS 1992* | MICS 2000** | DHS 2000*** | Census 2002**** | DHS 2005***** |
|--|----------------------|------------------------|------------------------|----------------------------|--|
| % of orphans (among all children) | 9.6 (<15 years) | 28.0 (<15 years) | 26.8 (<15 years) | 27.2 (<18 years) | 17.5 (<15 years) 20.5 (<18 years) |
| % of maternal orphans (with double orphans) | 3.0 (<15 years) | 8.3 (<15 years) | 8.9 (<15 years) | 8.3 (<18 years) | 5.7 (<15 years) 6.9 (<18 years) |
| % of paternal orphans (with double orphans) | 7.2 (<15 years) | 24.7 (<15 years) | 22.8 (<15 years) | 23.2 (<18 years) | 14.6 (<15 years) 17.2 (<18 years) |
| % of double orphans | 0.7 (<15 years) | 4.9 (<15 years) | 4.9 (<15 years) | 4.3 (<18 years) | 3.0 (<15 years) 3.8 (<18 years) |

Sources: Measure DHS 2004*, ONAPO/ORC Macro 2001a***, INSR/ORC Macro 2006****, UNICEF 2001**, UNICEF 2004**, SNR 2005b****

The comparison of census and the MICS and DHS surveys shows that the number of orphaned children increased drastically between 1992 and 2000. The overall percentage of orphans increased from an estimated 9.6% in 1992 to more than 25% in 2000. The number of maternal orphans almost tripled, the number of paternal orphans more than tripled, and the number of double orphans increased 7-fold. The surveys do not investigate the causes of these increases, but they highlight the impact of the genocide and likely reflect the effects of the HIV/AIDS epidemic.

The estimates generated by the MICS 2000 and the DHS 2000 are identical for the estimate of the number of double orphans and differ only slightly with regard to the other estimates. The 2002 national census data also resembles the MICS 2000 and DHS 2000 estimates. However, even though the census was conducted two years after the DHS and MICS, it includes orphans up to 18 years and thus a larger share of the orphan generation created by the genocide which may explain that slightly higher results were observed. Comparing the 2002 census with the 2005 DHS, we see a sharp drop in estimated orphan population, particularly with regard to paternal orphans. The decreasing numbers reflect children who lost their parents during the killings now moving slowly out of the age range and thus reducing the overall number of orphans. The same development is also indicated when comparing the DHS 2006 data for orphaned children under 18 with the same data for orphans under 15 years of age. All surveys find significant differences in orphan status between age groups with those children old enough to have experienced the genocide showing the highest orphan rates. More than 40% of these children had lost one or both of their parents at the time of the research (UNICEF 2004, INSR/ORC Macro 2006).

Like the Rwandan population census, DHS and MICS do not attempt to explain the change in orphan estimates but they provide some additional information on the population. The MICS 2000 examines present living arrangements of orphaned children (UNICEF 2004). The DHS 2006 provides the same information and in addition looks at a range of other statistics including access to schooling of orphaned children, their nutritional status, sexual activity, and outside support (medical, emotional, social/material, schooling) (INSR/ORC Macro 2006).

The DHS 2006 also identifies a separate category of “vulnerable children” that are defined as children “with a very ill parent” either living in the same household or not as well as children “living in a household with a very ill adult” and children living in a household with “an adult who died in the last 12 months.” Combining these children with the orphan populations results in an overall population of “orphans and vulnerable children” (OVC) of 25.6% among all children younger than 15 years (17.5% for orphans alone) and 28.6% among all children younger than 18 years (20.5% for orphans alone) (INSR/ORC Macro 2006). Other orphan indicators newly added to the DHS include whether or not parents living with children have arranged alternative care in case of their death, whether or not widows were able to keep the property they shared with their deceased husband, and whether households with adults who were very ill or died received outside support (medical, emotional, social/material) (INSR/ORC Macro 2006).

C. Model-Based Orphan Estimates

Model-based orphan estimates grew in popularity as the impact of HIV/AIDS on children became evident and improved orphan estimates were needed to guide public policy interventions. While AIDS orphan estimates may be derived from census or population-based surveys, the cause of mortality of parents is often unknown (and sometimes undisclosed), thus making this method unfeasible in those countries where access to health care is limited or unavailable to a large percentage of the population. In addition, population enumerations and large population surveys are time-consuming, costly, and may be difficult to implement in some settings. Model-based orphan estimates that do not count orphaned children directly but are derived from more general adult mortality, fertility and child survival statistics promise to overcome some of these obstacles.

Deriving orphan data indirectly from mortality, fertility and survival statistics is highly complex since many assumptions are made about each of these indicators. Also, there are considerable differences between populations. Early attempts to derive orphan data from statistical models differed in their underlying definitions, methods and assumptions: “In the past, several agencies have produced estimates of AIDS

orphans. These have differed because they have used different definitions and methods and have been based on different assumptions about HIV prevalence, epidemiology, and natural history. Because estimation of the number of children whose father has died (paternal orphans) or whose parents have both died (dual or double orphans) is relatively complex, some studies only present statistics on children whose mother has died (maternal orphans). Other studies have used simple assumptions to estimate paternal orphanhood that produce approximate estimates” (Grassly *et al.* 2005: 365).

More recent efforts to standardize orphan estimation based on models have been led by the UNAIDS Reference Group on Estimates, Modelling, and Projections, with the involvement of UNICEF, USAID and the US Census Bureau, among others. The UNAIDS Reference Group adopted models derived by Grassly and Timæus in 2002 (UNAIDS Reference Group 2002; UNAIDS/UNICEF/ USAID 2004: Appendix 2). The UNAIDS models have been used to generate AIDS orphan estimates as well as general orphan estimates.

The methodology and underlying assumptions of the UNAIDS models used to generate AIDS orphan and general orphan statistics are discussed in Grassly *et al.* (2005) and UNAIDS Reference Group (2002). In addition, the UNAIDS Estimation and Projection Package is described in Ghys *et al.* (2004). The most recent changes in the methodology and the introduction of plausibility bounds are discussed in Morgan *et al.* (2006). In general, different models are needed to estimate the number of maternal, paternal and double orphans. Unique models must also be employed to deal with estimates of AIDS orphans alone and estimates of the entire orphan population.

“Orphan numbers can be calculated from statistics on the deaths of adults by estimating how many children were born to those adults who have died and whether these children remain alive. In countries with an AIDS epidemic, the calculations need to allow for the impact of HIV infection on mortality and women’s fertility while accounting for the transmission of HIV from mother to child and between parents. Key inputs to the estimation procedure are thus AIDS and other-cause mortality data and fertility data by age and sex” (Grassly *et al.* 2005: 365).

The mortality, fertility and survival indicators that feed into model-based population estimates are influenced by a large number of factors, many of which differ from setting to setting. These data are not collected by the UNAIDS Reference Group, but have to be derived from census data, household surveys, demographic projections, or other sources. If these data are not available or if they are of poor quality, model-based orphan estimates either cannot be calculated, or they are likely to be biased. Model-based estimates thus rely heavily on the quality of the available data - a quality that is likely to differ for each indicator and between countries. In addition, they depend upon the accuracy of their many underlying assumptions. The models have been validated and adjusted in comparison with DHS and MICS household survey data (Grassly *et al.* 2004).

Model-based orphan estimates for Rwanda have been published as part of the statistical annex of major UN publications on orphaned children such as the UNICEF/UNAIDS/USAID report “Children on the brink” (2002, 2004), the UNAIDS “Report on the global AIDS epidemic” (2002, 2004, 2006), and the UNICEF report “Africa’s orphaned generations” (2003). Table 2 compares the model-based estimates of the total population of orphans in Rwanda published in the various reports with the 2002 national census data.

Table 2: Comparison of model-based orphan estimates versus census data in Rwanda

| | Census | Model 2001 | | Model 2003 | | Model 2005 | |
|---|----------------------------|----------------------|--|-----------------------|--|----------------|-------------------------|
| | 2002 | All orphans | AIDS orphans | All orphans | AIDS orphans | All orphans | AIDS orphans |
| Number of orphans | 1,151,878 (<18 years)***** | 613,000 (<15 years)* | 264,000 (<15 years)* 160,000 (<18 years)*** | 810,000 (<18 years)** | 160,000 (<18 years)** 160,000 (<18 years)*** 220,000 (<18 years)**** | Not calculated | 210,000 (<18 years)**** |
| Number of maternal orphans (with double orphans) | 352,417 (<18 years)***** | 329,000 (<15 years)* | Not calculated | 510,000 (<18 years)** | 140,000 (<18 years)** | Not calculated | Not calculated |
| Number of paternal orphans (with double orphans) | 982,086 (<18 years)***** | 429,000 (<15 years)* | Not calculated | 550,000 (<18 years)** | 130,000 (<18 years)** | Not calculated | Not calculated |
| Number of double orphans | 182,625 (<18 years)***** | 145,000 (<15 years)* | Not calculated | 240,000 (<18 years)** | 120,000 (<18 years)** | Not calculated | Not calculated |

Sources: UNAIDS 2004***, UNAIDS 2006****, UNICEF 2003*, UNICEF/UNAIDS/USAID 2004**, SNR 2005b*****

The comparison of the various estimates indicates major inaccuracies in the model-based estimates. First, the model-based estimates change considerably from year to year with modifications to the model being made in an attempt to improve the estimates. Although improving the model is desirable, the large impact that changes in the methodology have on the estimates does not indicate a reliable technique. For example, while the model initially assumed that there were 264,000 AIDS orphans under 15 years of age in 2001 (UNICEF 2003), a later version of the statistic set a revised estimate of the number of AIDS orphans under 18 years in 2001 at a much lower 160,000 (UNAIDS 2004). In a different case, the number of AIDS orphans in 2003 was initially estimated to be 160,000 for children under 18 years of age (UNICEF/UNAIDS/USAID 2004, UNAIDS 2004), but a revised estimate for the same year and age range more recently put the number at 220,000 (UNAIDS 2006).

More troublingly, there are large discrepancies between the model estimates and the census data, with the models greatly underestimating the total number of orphans. While the census identified 1,151,878 orphans under 18 years of age in the country in 2002 (SNR 2002b), the models only assume 613,000 orphans under 15 years of age in 2001 and 810,000 orphans under 18 years of age in 2003.

In addition to the total number of orphans, the assumed numbers of maternal, paternal and double orphans all show major discrepancies between the census data and the model-based data as well as between model-based estimates of differing years. The impact of the genocide in particular appears not to be taken fully into account by the models, most drastically with regard to the paternal orphans, which the 2002 national survey numbered close to one million while the 2001 and 2002 model-based estimates reported a figure near 500,000.

Furthermore, perhaps due to adjustments made to the model, the total number of orphans shows an increase between 2001 and 2003 for all orphan categories. While the 2003 data may be closer to the real population number, the reported gain cannot be explained by actual developments with all other statistics indicating that the number of orphans has been falling rather than growing in this period of time as the generation orphaned by the genocide moves out of the orphan age range. The model-generated time series published in “Children on the brink 2004” (UNICEF/UNAIDS/USAID 2004) appears in part to reflect the impact of the genocide, but still underestimates the extent of the impact and the associated huge increase in number of orphans (see Table 3).

Table 3: Model-based orphan estimates (number and percentage) over time in Rwanda

| | 1990 | 1995 | 2000 | 2003 | 2010 |
|---|---------|---------|---------|---------|---------|
| Number of orphans (<18 years) | 550,000 | 750,000 | 830,000 | 810,000 | 800,000 |
| Percentage of orphans (<18 years) | 14 | 18 | 19 | 17 | 14 |

Source: UNICEF/UNAIDS/USAID 2004

It is likely that the impact of the genocide poses special challenges, not present in other countries, to model-based estimates. It may well be that the model-based estimates of orphan numbers are more accurate elsewhere. However, major weaknesses in the Rwandan data generated by the models cannot be overlooked. Similar weaknesses can be assumed to play a role in the data generated for other countries. While remaining a promising approach, today’s model-based estimates still appear to be a far cry from providing the reliable and valid data they promise to deliver.

D. Orphans in Orphanages and Orphans Living on the Streets

Some of the most vulnerable groups of orphaned children - in particular orphans in orphanages and orphans living on the streets - are not adequately covered by any of the major methods of generating orphan estimates that have been previously described. Not living in a household and often without contact to any family member, both groups of children are unlikely to be included in population-based surveys often focused on surveying heads of households. A population census might include orphanages but orphans living on the streets will still be overlooked. The model-based estimates are calculated from population data derived from census data and household surveys and are thus as likely as the previous methods to exclude orphans in a non-household setting. This is not a major problem for the estimates since the numbers of orphaned children in orphanages and on the streets is very small compared to the

total number of orphans. However, this also means that separate studies will be needed to describe these special populations and serve the information needs of programs serving orphaned, abandoned, and run-away children.

One of the ways of generating population estimates of orphans in orphanages and orphans living on the streets involves sample surveys. Surveys in orphanages typically include interviews with educators and/or children at either all orphanages within the region of interest or a randomly selected sub-sample of institutions. The mobile population of street children is more difficult to sample and interview but time-location sampling may be used in an attempt to generate an equal probability sample. In many situations, projects serving street children can help to identify places where street children gather and provide a point of access to the population. Control or comparison groups may be used to compare institutionalized and homeless children with orphaned children that continue to live with members of the extended family.

Another commonly used method to generate estimates of high-risk minority populations like children in orphanages and street children is the analysis of records of organizations that provide services to these populations. Analysis of agency records can be a rapid and inexpensive way of generating population estimates and the results can be of high quality provided that records are accurately kept by the organizations and that the entire population is covered. Unfortunately, quality of agency records differs greatly, with some organizations keeping excellent records, others with records that are inaccurate or incomplete, and still others that do not keep records at all. In addition, program coverage often is incomplete, depending on program and population. While an analysis of agency records of all orphanages in a country may provide an accurate estimate of the population, an analysis of records of street children projects or other communal activities for children living on the streets will not result in accurate estimates: "To the extent that a problem is being adequately handled by existing programs, data from such programs may be useful and accurate, but that is not the situation in which data are usually needed" (Rossi *et al.* 1999: 132).

Key informant interviews are an even less reliable method to generate population estimates. They are often used when little time and resources are available, when estimates are needed of the number of street children or other difficult to access populations, or when the research involves sensitive topics. Key informants have been described as "those persons whose position or experience should give them some perspective on the magnitude and distribution of the problem" (Rossi *et al.* 1999: 135); however, research indicates that estimates made by key informants are often false. Many key informants have experience only with a subset of the population and they often tend to overestimate population numbers: "Although key informants can often provide very useful information about the characteristics of certain target populations and the nature of service needs ... few are likely to have a vantage point or information sources that permit very good estimation of the number of persons affected by a social condition or the demographic or geographical distribution of those persons" (Rossi *et al.* 1999: 135). Focus group discussions are likely to suffer from the same shortcoming attempting to derive conclusions from limited perspectives of a group often subjected to systematic bias.

With regard to Rwanda, a few studies have been conducted that focus on children in orphanages and street children. Most of these studies use multiple methods including sample surveys, interviews with program directors and other key personnel, analysis of agency records, focus group discussions and a range of other participatory techniques. This section focuses on what appear to be the most comprehensive studies and those using the most solid research design for describing the population.

Perhaps the most comprehensive study of children in orphanages after the genocide is Greenwell's "Profile of children in Rwanda's unaccompanied children centers: A report based on statistical indicators for 24 UAC centers" (2002). Greenwell studied the population of children - orphans and non-orphans - at

all centers for unaccompanied children (“orphanages”) that were registered with the Ministry of Local Government and Social Affairs (MINALOC) in Rwanda at the time the research was conducted. The research included interviews with program directors and other staff members as well as a desk review of archival records (family tracing documentation, child history reports, center registers, letters or attestations from local authorities, records on the child's health and education status), and observations and some conversations with children. However, no sample survey was implemented, and while a large number of program records were analyzed, Greenwell describes some limitations associated with the data and the data collection efforts of the administration at the orphanages:

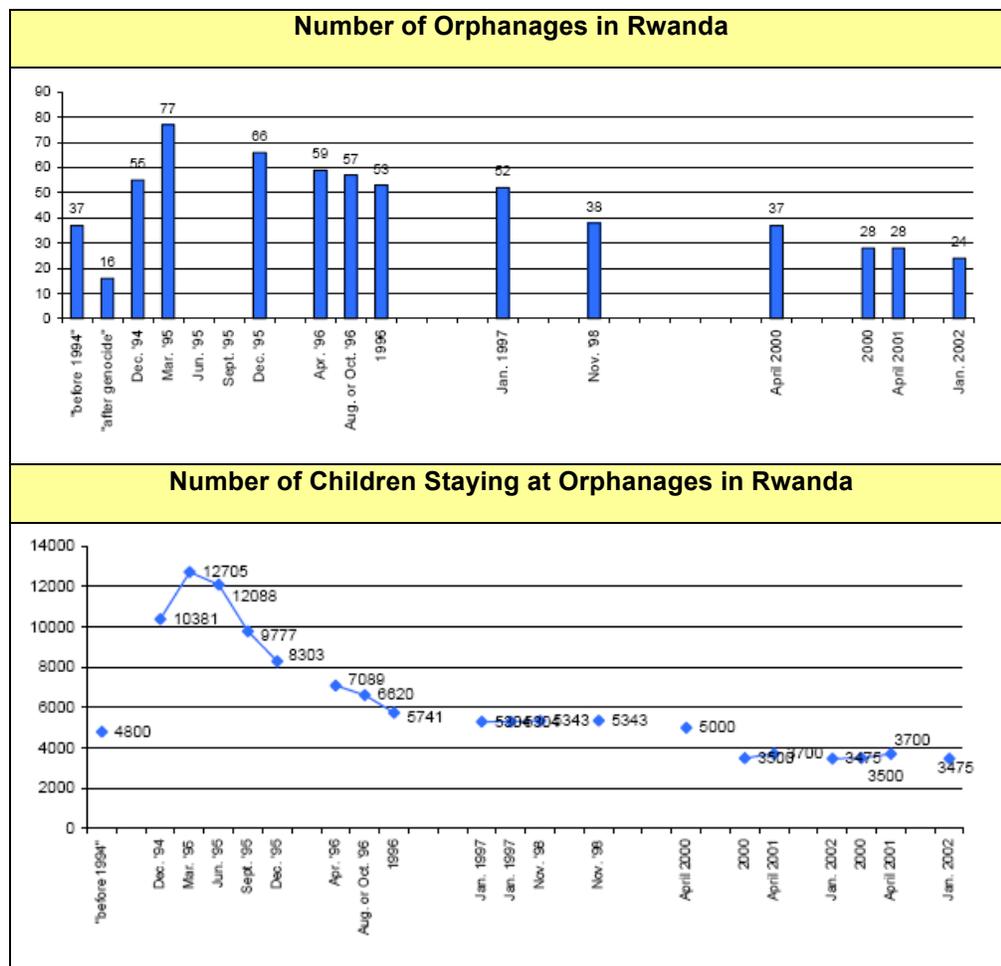
“In 1995 and 1996 many centres provided important monthly information on the population and movement of children, but during data collection for this study there was no evidence in most centres of a systematic method of maintaining these statistics. 16 of 24 centres stated that they report monthly to MINALOC, but a visit to MINALOC revealed that few reports from prior months were actually filed. Most centres also stated that they submitted regular reports to CRS (Catholic Relief Service) in order to receive basic food staples. The food gifts are contingent upon receiving the reports, and in fact, receipt of these reports was confirmed in CRS's Report on the Situation of Centres” (Greenwell 2002: 15).

The Greenwell study shows that the number of orphanages in Rwanda and the number of children staying in these institutions changed dramatically with the genocide. Only 12 orphanages exist in Rwanda today that were already in place before the genocide, while about 40 new centers were founded in 1994 and 1995 following the killings. Many of these new centers have since been closed and no new ones were opened in line with an official government policy opposed to the institutionalization of children. At the time the Greenwell study was conducted, a total of 24 orphanages remained, less than the number of orphanages in operation before the Rwandan genocide (Greenwell 2002: 11-12). The size of the orphanages differs from less than 50 to more than 500 children (Greenwell 2002: 18).

Like the number of orphanages, the number of children staying at these centers increased tremendously with the genocide. Earlier research set the pre-genocide number of children in orphanages at 4,800, with the orphanage population peaking in 1995 at 12, 705. A short-lived monitoring system intended to track indicators in children was established by the Rwandan government and UNICEF in 1995 and documented a decline of the orphanage population during the time in which many NGOs were active in reuniting separated families and placing orphans with extended families or in foster care arrangements. At the time of the Greenwell survey in 2002, 3,475 children were found staying at orphanages in Rwanda (Greenwell 2002: 13). Figure 1 illustrated the increase and decline of the number of orphanages and the number of children staying at orphanages in Rwanda.

Previous research has often found that children in orphanages tend more often to be male than female and the Rwandan case proved no different. The Greenwell study observed an overall sex ratio of 128 boys for every 100 girls, with little difference between urban and rural settings (Greenwell 2002: 18). With regard to the age of the children, the research found major variation in age between centers. This is not surprising considering that centers often focus on specific age ranges. The average age of the children at the time of the research was 11.7 years for boys and 11.5 years for girls (Greenwell 2002: 32-33).

Figure 1: Number of orphanages and number of children staying at orphanages over time in Rwanda



Source: Greenwell 2002, pp. 11, 13.

The Greenwell study attempted to identify the reasons why children are staying at the orphanages and found that 81% of them had come to the center because they were either “abandoned” or “orphaned” (Greenwell 2002: 21). However, it is clear that this general group may include many subgroups such as children whose parents were killed during the genocide as well as children whose parents died from AIDS or any other causes. In addition, many families had been separated during and after the genocide, and orphanages continued to “receive orphans and unaccompanied minors as part of the process of the repatriation of refugees” (Vaele *et al.* 2001: 19).

Remarkably, a very large percentage of the children staying at orphanages in Rwanda in 2002 were double orphans (>80%). Although the number of paternal orphans in the country is much higher than the number of maternal orphans, the number of paternal orphans in the orphanages actually is smaller than the number of maternal orphans (Greenwell 2002: 36). These findings contrast dramatically with the national census results for the general population from the same year (see Table 4).

Both the very high number of orphans in the centers and the fact that these orphans are overwhelmingly double orphans is also remarkable since it differs from findings of similar studies in other countries. Research of this author in the Democratic Republic of Congo (DRC), for example, indicated that only about one half of the children staying at orphanages in Kinshasa had experienced one or both parents

die, and among these children the percentage of double orphans was about 41%, with almost equal numbers of paternal and maternal orphans (DeBuhr 2006).

Table 4: Comparison of number and percentage of orphans in general population (census data) with number and percentage of orphans in orphanages

| | Census 2002* | | Orphanage survey 2002** | |
|---|---|--|---------------------------------|---|
| | Number of orphans in population (<18 years) | % of orphans in population (<18 years) | Number of orphans at orphanages | % of children staying at orphanages that are orphaned |
| All orphans | 1,151,878 | 27.2 | 3,382 | 97.4 |
| Maternal orphans (with double orphans) | 352,417 | 8.3 | 3,169 | 91.3 |
| Paternal orphans (with double orphans) | 982,086 | 23.2 | 3,031 | 87.3 |
| Double orphans | 182,625 | 4.3 | 2,818 | 81.2 |
| Children not orphaned | 2,959,463 | 72.8 | 80 | 2.6 |

Sources: SNR 2005b*, Greenwell 2002**

It is likely that the genocide and subsequent efforts to reintegrate children staying at orphanages with their families are major factors behind the high concentration of double orphans among the children remaining at the institutions. Greenwell finds that orphan status appears to have been the overwhelming reason for entering an orphanage in the years following the genocide but that social factors are now playing a larger role (Greenwell 2002: 22). With regard to efforts of finding alternative care for the children in orphanages, Greenwell notes that “by November 1996, the IRC (International Red Cross) registered 27,770 children reunified or placed in a family, many of whom were presumably registered in UAC centres” (Greenwell 2002: 13). In a different study, Vaele *et al.* state an estimate made by the Rwandan government that “in excess of 70,000 children have been reunited with families since 1994” (Vaele *et al.* 2001: 19). Given the fact that only about 3,500 children remain in the centers, it is evident that reunification efforts are likely to have had a major impact on the demographic composition of the children remaining at the centers. It can be assumed that double orphans are more difficult to reunite with their families. There is also indication that girls are more easily placed in foster care than boys (Vaele/Dona 2003: 264).

Examining the cause of death of 4,119 parents of children in orphanages, Greenwell found that about 2,000 (50% male, 50% female) had been killed., About 100 mothers and 50 fathers had died from AIDS, while the remaining deaths were due either to a non-specified illness or accident, or the cause of death was unknown (Greenwell 2002: 38). These results are imprecise but show that the genocide continued to have a strong influence on the children of Rwandan orphanages in 2002. Up to half of the children had experienced the murder of a parent, a fact alone that is likely to result in a Rwandan orphan population that is significantly different from the orphan population in any other country.

Looking at a different population - the population of street children in Rwanda - Vaele and Dona conducted a survey of 290 street children described in "Street children and political violence: a socio-demographic analysis of street children in Rwanda" (2003). In addition to collecting survey data, the authors used observational mapping techniques to examine "the profile and activities of Rwandan street children." Focus group discussions and key informant interviews were also implemented in order to assess "the relationship between street children and the broader Rwandan society" (Vaele/Dona 2003: 253).

The authors argue that the number of street children in Rwanda has been growing in recent years and that this increase is likely to be conflict-related: "In Rwanda, for example, while street children were evident on the streets of urban centers pre-1994, there has been a rapid increase in the observed number of street working and homeless children since the genocide of 1994" (Vaele/Dona 2003: 354). Vaele and Dona quote two estimates of the total number of street children in the country but caution that these estimates are not likely to be reliable: the Ministry of Social Affairs (MINITRASO) estimated in 1996 that there were 2,670 children working or living on the streets in Rwanda while the United Nations Common Country Assessment estimated in 1999 that these numbers were about 6,000 (Vaele/Dona 2003: 357).

Vaele and Dona used a rather wide definition of a street child as "an individual under 18 years, who may be working in the street, begging for food or just hanging around, and who is unaccompanied by an adult or guardian" (Vaele/Dona 2003: 360). The survey was implemented in July-September 1998 in four towns (Kigali, Byumba, Kibungo and Butare) and the children were selected using non-probability sampling techniques ("convenience sampling"). In Kigali, 139 street children were interviewed; 58 in Byumba, 54 in Kibungo, and 39 in Butare. The interviews in Butare took place not on the streets but at the site of a newly created government center for street children.

Vaele and Dona found that the vast majority of the interviewed children (91%) were male, just 9% were female and the mean age was 14.2 years (Vaele/Dona 2003: 359-360). Only 42% of the children were actually found homeless while 54% spent the night in the house of a family member or guardian, 1% slept at an orphanage and the remaining 3% cited some other arrangement (Vaele/Dona 2003: 361-362). The vast majority of the children (87%) started their street life after the genocide, a finding consistent with an earlier study by Munderere (1996) who also found that 90% of the children started living on the streets after 1994 (Vaele/Dona 2003: 360).

Regarding the orphan status of the children, the research found that "of the 290 children interviewed, 33% reported that both parents were dead, and another 4% did not know the whereabouts of both parents. Less than a quarter had both parents alive (22%). Twenty seven percent reported their father was dead and mother alive, and 7% had the mother dead and father alive. In addition, 2% did not know the whereabouts of their father although their mother was alive, 3% did not know the whereabouts of their mother but had a surviving father, and 2% reported their father was dead and they did not know where their mother was" (Vaele/Dona 2003: 260-261). Major causal factors cited by the children for living on the streets include "poverty" (37.9%), "lack of guardian" (17.9%), "disharmony with family/guardian" (16.6%), "parent dead - but child cites having a guardian" (9.3%) and "left the countryside/lost job/pull of streets" (8.3%) (Vaele/Dona 2003: 363). Table 5 compares the percentage of orphans in the general population with the percentage of orphans in orphanages and the percentage of orphans living on the streets.

Table 5: Comparison of percentage of orphans in general population (census data) with percentage of orphans in orphanages and percentage of orphans living on the streets

| | % of orphans among all children in population* (<18 years, 2002) | % of orphans among all children at orphanages** (2002) | Percentage of orphans among survey population of street children*** (1998) |
|---|--|---|---|
| All orphans | 27.2 | 97.4 | 78 |
| Maternal orphans (with double orphans) | 8.3 | 91.3 | 40 (+ 3 with mother missing, father alive) |
| Paternal orphans (with double orphans) | 23.2 | 87.3 | 60 (+ 2 with father missing, mother alive) |
| Double orphans | 4.3 | 81.2 | 33 (+ 6 with one parent missing, other parent missing or dead) |
| Children not orphaned | 72.8 | 2.6 | 22 |
| N | 4,111,341 | 3,462 | 290 |

Sources: SNR 2005b*, Greenwell 2002**, Vaele/Dona 2003***

Compared to the census data and the orphanage data, the street children survey data appears to be somewhere in-between the two other populations. Like the orphanage population, most street children had lost one or both of their parents, even though the percentage of non-orphans among the street children was, at 22%, considerably higher than the percentage of non-orphans among the children staying at orphanages. Likewise, the percentage of double orphans among the street children was, at 33%, less than half the percentage of double orphans among the children staying at orphanages but it was more than seven times the percentage of double orphans in the general population. Like the census data, the street children survey records more paternal orphans than maternal orphans. This differs from the orphanage study which found the percentage of maternal orphans to be higher than the percentage of paternal orphans.

However, it must be considered that children working on the streets but having a home were included in the survey population of the Vaele/Dona study who most likely are less frequently orphaned than the homeless children. In addition, the use of non-probability sampling and the small sample size question the validity and reliability of the results of the street children research. The research design does not allow for conclusions beyond the study population and general population estimates cannot be derived from the analysis. Finally, the survey was implemented in 1998, just four years after the genocide and in a time when massive population movements were still in the process. There is high probability that the street children composition and characteristics have changed considerable since this time.

IV. Conclusions

The case of Rwanda is unique in that the 1994 genocide had a massive impact on the country's orphan population, likely tripling its size. In recent years, the HIV/AIDS epidemic has had considerable influence on the country as on the rest of the continent, further increasing the number of orphaned children.

Comparing the various methods used to generate orphan estimates, the research indicates that the census data and the household-based population surveys (DHS and MICS) generate valid and reliable estimates, but that the model-based estimates are often inaccurate. The problems associated with the model-based estimates may be explained in part by the strong and lasting impact of the genocide on the country, an event that is unique to Rwanda. In addition, the formula used to generate the model-based orphan estimates changed over time with considerable impact on the results for Rwanda. It appears that until the models improve, any model-based estimates have to be treated with caution.

Neither census data nor household surveys nor model-based estimates capture the number and characteristics of special populations including the high risk groups of street children and children in orphanages. While a few studies have looked at children outside family care in Rwanda, little of this research has been systematic and, particularly with regard to the street children, reliable estimates cannot be derived from the research findings. Both the population of orphans in orphanages and the population of street children have changed considerably with the genocide and in the subsequent years caused any research to be outdated after a short period of time. It is with regard to these special populations that the current research needs are the greatest. Some research needs that are evident from the findings of this literature review include:

1. A larger and more rigorous study of street children (using probability sampling),
2. An update of the Greenwell orphanage survey (since it is certain that number of children and the population characteristics have changed in the past four years),
3. A more systematic study of causes and contributing factors to children entering orphanages (or start living on the streets),
4. A case-control study comparing orphans in orphanages and orphans in family care,
5. A systematic comparison of the characteristics of children who entered orphanages following the genocide compared with younger children, and
6. Research on the long-term development of orphans reintegrated into families and children in foster care.

While the case of Rwanda is covered well by research estimating the total number and percentage of orphaned children, critical knowledge regarding subgroups and particular population characteristics is missing. Above all, an understanding of the size of high-risk populations and their specific characteristics must be reached to achieve successful intervention planning and implementation.

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